

netted of *Nisoniades tages*—two just out, and obviously of a second brood. *Aspilates gilvaria* was commoner than I have ever before seen it, but *Eubolia bipunctaria* was decidedly scarce. A *Noctua* flying from flower to flower in the sun proved to be *Cerigo matura*, a habit I have never before noticed in this species.*

Through late June and July, we had rooms at a farm near Ongar, but although I spent many of my evenings there, travelling to town each day, I had little time for Entomology. A very casual survey of the district was promising and the following is a list of the more interesting species noted; *Trichiura crataegi* (larvæ), *Miltochrista* (*Calligenia*) *miniata*, *Zeuzera pyrina* (*aesculi*) (very rare in my experience away from London), *Cymatophora duplaris*, *Plusia pulchrina*, *Triaena* (*Acronicta*) *tridens*, *Orthosia suspecta*, *Cleoceris riminalis*, *Petilampa* (*Tapinostola*) *arcuosa*, *Habrostola tripartita*, *Cidaria silaceata*, *Eupithecia rectangularata* (black form), *Acidalia emarginata*, *A. imitaria*, *Mesoleuca* (*Melanthia*) *albicillata* and *Fbulea crocealis*.

Diloba caculicocephala and *Malacosoma* (*Bombyx*) *neustria* larvæ were abundant, and never before have I seen so many *Porthesia similis* (*auriflua*) both in larval and perfect states. Treacle was as usual an utter failure, and the greatest attractions proved to be the grasses and sedges by the roadside and the American willow-herb in the woods. There is a most attractive-looking treacling ground in Ongar Park Wood, and I shall hope in other years to work the district more thoroughly.

The war stopped all other work, and although I had intended compensating myself for the loss of a holiday by taking several odd week-end trips, the anxieties of the August and September campaign drove the inclination away, and I have done nothing since. Perhaps during the continuation of the war, this will be a general effect and lepidoptera consequently get a much-needed rest. If this be so, when all is finished, and we settle down again, we shall be able to claim for our own particular study, a definite good out of all the evil; and more especially so, as we have had a year of more than usual plenty as a starting-point.

“Notes on the Taxonomic Value of the Genital Armature in Lepidoptera.”

By F. N. PIERCE, F.E.S.

The following critical remarks have been suggested by a paper under the above title which appeared in Part ii. of this year's *Transactions of the Entomological Society of London*, from the pen of Mr. G. T. Bethune-Baker.

The author's name is so well known amongst entomologists that any article by him carries great weight, and when I read the title “Notes on the Taxonomic value of Genital Armature in Lepidoptera,” I looked forward with much pleasant expectation to the perusal of the text. Alas! I cannot say that my expectations were realised, and letters received from correspondents interested in genitalia revealed the fact that they too found themselves unable either to understand the

* I noticed this habit some years ago on the railway banks at Thomastown, near Waterford.—H.J.T.

article or to make anything of the plates which accompany it. They confessed that they were completely mystified and had given up the attempt in despair. These facts have induced me to make the following critical suggestions, in the hope that they may assist future writers on this most important branch of entomological study in making their communications such as can be more easily understood by the student.

With the avowed and modest object of Mr. Bethune-Baker's paper I have, of course, no quarrel. Although perhaps it is a little belated to set out to prove the long established fact that genitalic differences in lepidoptera have both specific and generic value. One of my correspondents wrote that it was hardly worth while going through so much to get so little.

The points I wish to deal with concern rather those matters which make the paper so difficult, or even well nigh impossible, to follow, and are these: (i) The use of photographs for the plates; (ii) the profile method of mounting the genitalia; and (iii) the employment of unrecognised names and descriptive phrases for the various parts and organs.

(i) First, I am convinced that photography is far from being a happy method of depicting the structure of the genital organs. It is one thing to see the mount through the microscope and quite another to see the reproduction in the photograph. A photograph, while from one point of view showing too much, *i.e.*, parts that have no particular significance, from another point of view conceals far more than it reveals. Even in the best photographs the superimposed masses give such a confused picture that the organs cannot be discerned, whilst many important features do not appear at all. The result is that only a very small percentage of the parts described in the text can be made out with any degree of certainty in the plate, and when, as in the article before me, an unscientific printer, whose only idea is apparently to fill up a blank space, has used every possible variation in the position of the figures, and when, moreover, the figures appear without titles, the student has to add sleight of hand to his other qualifications, for he must keep the book open at three places, whilst he twists in all directions in order to get the figure the right way up. From the point of view of instructive value there is no comparison between a photograph and a drawing. The latter reveals to the student what the master's eye can see, and whilst obscuring and unimportant parts can be omitted it is possible to present with clearness every feature and organ that is of characteristic and distinctive value. With a drawing it is possible to follow the descriptions of the text, with a photograph this can only be done in part, and that with the greatest difficulty.

(ii) In the second place I would suggest that while the method of mounting the genitalia so as to give a side view is occasionally necessary, in most cases the ventral view discloses the organs in a far more comprehensible manner. It is only necessary to lay the abdomen on its back and then turn back the enclosing valve to allow the student to see right into the genital cavity, with all the organs visible and the paired organs systematically arranged. A glance at the object thus mounted will reveal what it would take a very long study of the side-way mount to discover, and much more that the latter method could never show.

(iii) In the third place, I do most earnestly deprecate the employ-

ment of unrecognised names and descriptive phrases for the various organs. It is quite impossible for even those who have had considerable apprenticeship in the study of the genitalia to recognise what organs are thus referred to. The want of uniformity in our terminology is at once unnecessary and the cause of hopeless confusion, not only to the student but also to the advanced worker.

In this article before me I find that the names employed are for the most part not generally accepted, or they are recognised names used to denote quite other parts than they commonly signify, indeed one can only hazard a very uncertain guess as to the organs to which they refer. I select the following for comment. *The Claspers* fairly obviously denote the valve. *The Tegumen* apparently denotes only the dorsal part of the whole organ to which the name rightly belongs, but it also appears to include the uncus, which in the article is only obscurely alluded to. *The Girdle* one must conclude is used for the remainder (by far the larger part) of the tegumen. When, however, we come not only to an upper and lower girdle, but also to an inner and outer one, I confess I have to give it up. *The Falces* can only stand for the gnathos when the two arms of this organ are widely separated. *The Dorsum and Dorsal Bridge* one judged to be the uncus. *The Curtain* is a puzzle, but may denote the socii, whilst the *Lateral Cheeks* is a descriptive expression that does not seem to help much. *The Fulcrum* evidently represents the sacculi when projecting ventrally and fused together, that is to say the furca. In addition to the use of such unrecognised names, I find forwards and backwards, front and rear, employed with the opposite of their usual significance, forwards here denoting towards the tail of the insect, backwards towards the head! Sternite and tergite occur freely regardless of the fact that no settlement has yet been attained as to what organs constitute these pieces, whilst, perhaps wisely, the question as to which segment of the body they belong is ignored. The expression, "the end segment of the abdomen proper," leaves me wondering.

Now with such a terminology it is not a matter of surprise that the student is left baffled and in despair. What can he be expected to make of this on page 316? "The girdle is erect, expanding suddenly forwards below the tegumen, which is funnel shaped, deeply excavated in front with the dorsum terminating in a blunt point. Whilst the lower part is bifid, also terminating in blunt points, below these are the falces, broad and strong, suddenly curved upwards near the tips with one or two sharp teeth near the bend; the apices of the lower part of the tegumen are furnished plentifully with bristles, but the dorsum very sparingly." Or of this again on page 320. "The general outline to end of section." Or suppose he attempts to compare the figure of *Tirumala petiverana*, No. 25, with the description on page 323, he can only conclude that the figure has been wrongly numbered.

Now all this incomprehensible confusion is not only sad but unnecessary. Dr. McDonough, in the *Canadian Entomologist* for June, 1911, has given us a list of names which rightly belong to the different parts under the law of priority. These names are now in common use amongst workers, and I have given a list of them and others with full explanations in "The Genitalia of the Geometridæ." If only writers would adopt accepted names the progress of our study would be immensely facilitated, whilst much that is now incomprehensible to

the student would become plain. The present want of uniformity in the terminology brings the whole study of the genitalia into discredit, and daunts the hearts of many would-be students.

In making the above critical remarks I am moved only in the hope and wish that better things are coming.

“Notes on the Taxonomic Value of the Genital Armature in Lepidoptera.” A Reply.

By G. T. BETHUNE-BAKER, F.L.S., F.E.S.

Mr. Pierce's criticism of a paper of mine is interesting as a case of special pleading for his own views to be generally adopted. I fear, however, that he and I look at things from different points of view and I think I know that he is not likely to come to my point of view, whilst with my very long experience in this section of morphology, backed up as it is by some of the ablest insect anatomists on the Continent, I am not at all likely to accept his statements.

Mr. Pierce says, “it is a little belated to set out to prove the long established fact that genitalic differences in lepidoptera have both specific and generic value.” My critic's statement is true as regards many lepidopterists, but he is evidently ignorant of the fact that many do not at all believe in them and that among them will be found systematists who are really eminent to-day. This is, moreover, proved to some extent by the small number of subscribers to his volume, *viz.* 132, which number includes 20 copies to two publishers which have been counted as twenty subscribers. I will now consider his criticisms in his own order.

(i.) Photography. Mr. Pierce's criticism that superimposed masses give a confused picture is true: “that the organs cannot be discerned” is entirely incorrect, whilst “many important features do not appear at all” is generally speaking equally incorrect, though of course in some figures where I have wanted to bring out certain particulars it may be true that I have let them disappear in the reproduction. The real point of the photograph, however, is that it shows all the organs (under ordinary circumstances) in their proper proportion, in their proper place, and in their natural position if the profile view is taken. The drawing shows, as Mr. Pierce himself practically says “what the master's eye sees,” or rather what he wants his readers to see. Mr. Pierce's own drawings convict him absolutely. Look at his books and they show in the plates the gradual change and formation of his opinions, he emphasises his views in the view he gives his readers in the figures. We see *what Mr. Pierce's hand* has brought prominently into view, such a prominence would not be given by photography and does not exist in the object. All the parts are co-ordinated together, and their relativity is shewn in a photograph, while it is quite decidedly absent in Mr. Pierce's drawings by hand. From the point of view of scientific value there is certainly no comparison between a photograph and a drawing.

(ii.) “The profile position.” I had no intention of ever attacking Mr. Pierce's method, feeling that every man must work on his own lines—some years ago, I think, before his book on the *Noctuae* was published, I wrote to him pointing out the value of the profile view